C. Remarks

The claims are 3-5 and 7-9, with claims 3 and 9 being independent. Claim 3 has been amended to better define the claimed invention. New claims 8 and 9 have been added. Support for the amendment and the new claims may be found in original claims 3, as well as in the specification at pages 21-23 and in Example 1. No new matter has been added. Reconsideration of the present claims is expressly requested.

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being allegedly obvious from U.S. Patent Application Publication No. 2002/0061431 A1 (Koyama) in view of U.S. Patent Application Publication No. 2002/0001744 A1 (Tsusaka), as evidenced by U.S. Patent Application Publication No. 2003/0158273 A1 (Kosako). Claim 5 stands rejected under 35 U.S.C. § 103(a) as being allegedly obvious from Koyama in view of Tsusaka, as evidenced by Kosako, and U.S. Patent No. 6,218,035 B1 (Fuglevand). Claims 4 and 7 stand rejected under 35 U.S.C. § 103(a) as being allegedly obvious from Koyama in view of Tsusaka, as evidenced by Kosako, and U.S. Patent No. 6,523,699 B2 (Akita). The grounds of rejection are respectfully traversed.

Prior to addressing the merits of rejection, Applicants would like to briefly discuss some of the features and advantages of the presently claimed invention. That invention, in pertinent part, is related to a method for producing a membrane electrode assembly for a proton-exchange membrane fuel cell, which comprises a polymer electrolyte membrane and an electrode metal catalyst layer. At least a part of the polymer electrolyte membrane infiltrates into the electrode metal catalyst layer.

According to the presently claimed production method, the polymer electrolyte membrane is not merely bonded to the electrode metal catalyst layer. The electrode metal catalyst layer is coated with a composition of a precursor of the polymer electrolyte membrane to form a precursor layer, where at least a part of the composition infiltrates into the electrode metal catalyst layer, and then an electrode metal catalyst fixed to another electrode is brought into contact with a coated surface. The precursor layer is then irradiated with an active energy ray to simultaneously conduct formation of a polymer electrolyte membrane and bonding of the polymer electrolyte membrane with the electrode metal catalyst layer such that at least a part of the polymer electrolyte membrane infiltrates into the electrode metal catalyst layer.

Producing the membrane electrode assembly in this manner improves the bonding between the polymer electrolyte membrane and the electrode catalyst layer and reduces internal resistance. It also leads to the formation of a three-dimensional three-phase interface to increase a reaction area. As a result, a high-output membrane electrode assembly is provided.

Koyama is directed to a solid polymer electrolyte. In this reference, an electrolyte solution containing the electrolyte membrane material is applied to the catalyst layer, and then an already formed electrolyte membrane and the catalyst layer are hot-pressed together (paragraph [0061]). Accordingly, Koyama does not disclose simultaneously conducting formation of a polymer electrolyte membrane and bonding of the polymer electrolyte membrane with the electrode metal catalyst layer by a polymerization process.

Also, Koyama clearly does not disclose or suggest a process in which an electrode metal catalyst fixed to another electrode is brought into contact with a surface of the electrode metal catalyst layer, which is coated with an electrolyte membrane precursor solution, before polymerization and formation of the membrane takes place. In Koyama, the applied electrolyte solution must be brought into contact with the pre-formed electrolyte membrane.

Tsusaka is directed to a membrane electrode assembly and solid polymer electrolyte fuel cells. Tsusaka teaches adding a reactive metalloxane monomer both to the catalyst layer and the electrolyte membrane, and thereafter bringing the catalyst layer and the electrolyte membrane into contact with each other for bonding. This reference does not disclose or suggest coating the electrode metal catalyst layer with a membrane precursor composition. In fact, such a coating would appear to prevent the reactive metalloxane monomers in the formed catalyst layer and the electrolyte membrane from bonding. Thus, Tsusaka, like Koyama, fails to disclose or suggest coating the electrode metal catalyst layer with a membrane precursor composition and the contacting this coating with an electrode metal catalyst fixed to another electrode before polymerization is completed.

The Examiner cited Kosako as evidence that coating in Koyama inherently leads to infiltration. Even if so, Kosako does remedy the above-discussed deficiencies of Koyama and Tsusaka. Moreover, Kosako teaches away from coating an electrode metal catalyst with a membrane precursor material and infiltration (paragraph [0105]).

Neither Fuglevand nor Akita can cure the deficiencies of Koyama and Tsusaka. These references are not concerned with simultaneous formation of the polymer

electrolyte membrane and its bonding with the electrode metal catalyst layer and infiltration, or the process of achieving it as claimed.

Accordingly, Applicants respectfully submit that the cited documents, whether considered separately or in any combination, do not disclose or suggest all of the presently claimed elements.

Wherefore, withdrawal of the outstanding rejections and passage of the application to issue are respectfully requested.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

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